Ambidexterity in Projects: an Intellectual Capital Perspective

Abstract

This paper examines the role of knowledge assets in projects. We identify the desirability of simultaneously using knowledge assets both to exploit and explore (ambidexterity) and highlight the significance of this for the project context. We use an intellectual capital perspective and theorise that managing projects draws upon human, social and organisational capital. We examine how this is used by managers, in a qualitative empirical study of managers in technology projects, to explain better how ambidexterity is achieved in projects.

Ambidexterity in the use of knowledge assets is shown to exist in the practices of managers but without them necessarily having a conscious strategy for it. We identify the mechanisms by which this happens and note the distinctive role of social capital. We demonstrate the integrative nature of the mechanisms, and how each mechanism can involve the deployment of either single or multiple elements of intellectual capital. In so doing we extend existing theory to the operational level and demonstrate the utility of this approach.

Keywords

Ambidexterity, exploitation, exploration, intellectual capital, projects.

1. Introduction

March (1991) conceived of organisational learning in terms of *exploitation* (refining existing knowledge) and *exploration* (developing new solutions). These were originally considered as mutually exclusive because they compete for scarce resources, but an emerging body of scholarly work has shown that they can both be achieved by an *ambidextrous* organisation. The benefits of ambidexterity are thought to include superior financial performance (e.g. He and Wong, 2004; Morgan and Berthon, 2008) and increased organisational longevity (O'Reilly and Tushman, 2011). The contribution to organisational performance has been shown (see the reviews by Junni et al., 2013; O'Reilly and Tushman, 2013). Indeed, Sarkees and Hulland (2009) found that an ambidextrous firm strategy has a positive effect on four dimensions of performance: sales revenues, profits, customer satisfaction, and new product introductions. It is surprising, therefore, how little empirical evidence exists demonstrating the underlying mechanisms of ambidexterity at the operational level, i.e. the way in which ambidexterity is actually achieved in organisations. We understand operational-level ambidexterity as the managerial practices or mechanisms that individuals employ in order to achieve both exploitation and exploration at an operational level – specifically, in projects. We distinguish this from the higher-level theorisation and empirical studies (primarily at the level of the organisation) that are prevalent within the literature and discussed later.

In this work we highlight the relevance of ambidexterity to our understanding of project management (PM), and show how project managers enable both exploitation and exploration. We have used this approach with post-experience MSc students and also with executive education students and feedback indicates that this is a beneficial way to conceive of project work and the project management role.

We take a knowledge-based view (Grant, 1996) specifically, using an *intellectual capital* (IC) perspective (specifically, human capital, social capital, and organisational capital, explained shortly) to identify the configuration of knowledge resources which enable ambidexterity in projects. We present the results of an empirical study with evidence drawn from managers in a global IT-services firm working in technology projects. We show that ambidexterity is achieved routinely in this environment but not as a result of any intentional strategy in the cases investigated. We similarly identify that the individual IC elements are also used in both exploitative and exploratory forms. Moreover, whilst individual knowledge resources can be used in an ambidextrous manner, we show that they are also used in combinations.

The main contribution of this paper is the empirical identification of the mechanisms which enable ambidexterity at an operational level, specifically in projects. This offers both an extension of existing academic theory regarding ambidexterity, and also a novel interpretation of the role of the project manager which practitioners have found valuable. A secondary contribution is methodological, in that we use 'parallel coding' of our interview data to highlight the interactions of the various forms of intellectual capital, and this is powerful in identifying key mechanisms underpinning the attainment of ambidexterity.

2. Literature

The use of the term of 'ambidexterity' in the management literature has increased significantly (Raisch et al., 2009; Birkinshaw and Gupta, 2013), and been applied to multiple areas of research (Simsek, 2009). Whilst the generic meaning of ambidexterity is the ability to pursue two apparently contradictory objectives simultaneously, there is no consistent

definition across the areas of research. In their study, Turner et al. (2013) include a variety of interpretations, including: simultaneous efficiency, innovation and flexibility (Achrol, 1991); exploitative and exploratory innovation (Benner and Tushman, 2003); controllability and responsiveness (Graetz and Smith, 2005); and innovation and efficiency (Sarkees and Hulland, 2009). For the purposes of this paper, we return to its organisational learning roots and define ambidexterity as the ability to use and refine existing domain knowledge (exploitation) whilst also creating new knowledge (exploration) necessary for the planning and execution of work.

2.1 Ambidexterity – an Overview.

At the organisational level, three major forms of ambidexterity have been identified. In 'temporal' ambidexterity (Tushman and O'Reilly, 1996), exploitation and exploration activities are separated in time (i.e. one follows the other). 'Structural' ambidexterity (O'Reilly and Tushman, 2004), or the 'partitional' approach (Simsek et al., 2009), has exploitation and exploration separated by organisational unit, coordinated by senior management. An example would be running an R&D unit separately from the rest of the 'day-to-day' operational activities of an organisation, since the processes, routines and behaviours suitable in one group may be inappropriate for the other. Whilst these original conceptualisations of ambidexterity involved a separation through time or organisational membership between those engaged in exploitation and exploration, others have considered coexistence. Gibson and Birkinshaw (2004:209) identify business-unit level 'contextual' ambidexterity where individuals demonstrate "the behavioural capacity to simultaneously demonstrate alignment [exploitation] and adaptability [exploration]" through their daily choices and actions. These concepts are primarily understood at the organisational level,

though, and are insufficient to explain in detail the attainment of both exploitation and exploration at the operational level.

These theoretical models of ambidexterity do not sufficiently account for the complexity inherent in contemporary organisations (Geraldi et al., 2011a; Maylor et al., 2013), and we may reasonably expect both exploitation and exploration to occur at any point in time. For example, novel research programmes will also use standardised administrative processes, and a manufacturer with expertise in repetitive operations will trial new technology alongside standard production runs. Birkinshaw and Gupta (2013) describe this coexistence as 'nested' ambidexterity. Rather than competing for scarce resources, as March (1991) indicated, the dominant view within the literature is that exploitation and exploration temporally and organisationally co-exist as *orthogonal* (i.e. perpendicular to one another) dimensions of learning (Cao et al., 2009; Gupta et al., 2006; Raisch et al., 2009). It is this logic that we follow and investigate how they co-exist in organisations where there is no structural or temporal separation, specifically in complicated organisations where interactions and boundaries may not be so clear-cut (Benner and Tushman, 2003; Gupta et al., 2006). Existing studies have not focused on this context (e.g. Cao et al., 2009; Grover et al., 2007; Lin et al., 2007), and this is important, as most organisations comprise dynamic, multi-layer, structures, including evolving relationships with suppliers and customers.

Using projects as a context for investigating ambidexterity is important. Turner et al. (2013) show that empirical studies to date have been primarily at the organisational level, and predominately quantitative. We lack a clear understanding of 'how' ambidexterity is enabled at the operational level. Further, previous scholars have used organisation-level measures of exploitation and exploration in a wide range of industries, yet it is often not clear exactly

what ambidexterity actually means in that context, nor why it should be a suitable setting for a study. O'Reilly and Tushman (2013) comment that when studies are performed in bank branches, it is difficult to know what exploitation and exploration represent, especially when compared to industries in which exploration means using a new technology or business model. Our argument is that the project context is an ideal one in which to investigate ambidexterity. The APM BoK definition of a project (APM, 2012:241) as a "unique, transient endeavour undertaken to achieve planned objectives" succinctly captures the rationale. Standards, frameworks and tools (e.g. for planning and control) are readily available to the manager (i.e. exploitation), yet all practical projects have a degree of novelty which necessitates knowledge generation (exploration). Our initial thesis therefore was that both exploitation and exploration would be readily identifiable in this context. This also has specific advantages given that project-based working is the dominant form of organising in contemporary organisations which rely heavily on exploitation and exploration (Davies and Hobday, 2005; Liu and Leitner, 2012; Maylor et al., 2006; Winter et al., 2006). This lies behind our focus on the project as the unit of analysis to understand the mechanisms underpinning ambidexterity. Furthermore, our case organisation (introduced shortly) is in the IT-services industry. Reviews by Junni et al. (2013) and O'Reilly and Tushman (2013) show that ambidexterity is particularly valuable in high technology and service industries, where market and technological uncertainty is high. IT-service projects would therefore seem an ideal setting for an investigation of the underlying mechanisms.

In this study we heed the call of O'Reilly and Tushman (2011:8) who write that "what is needed is a greater insight into the specific micro-mechanisms required for a manager to implement and operate an ambidextrous strategy." In so doing, we also contribute to the debate regarding individual ambidexterity (Raisch et al., 2009; Mom et al., 2009), the

importance of the manager (Birkinshaw and Gupta, 2013), and ambidexterity at the operational level (Chandrasekaran et al., 2012; McCarthy and Gordon, 2011; Patel et al., 2012). This is especially relevant in the PM field if, as we suspected, a state of ambidexterity supports project operations.

Our approach to the considerable body of literature on ambidexterity comprised three stages. In the first, we drew on the systematic literature review of Turner et al. (2013). They analyse ambidexterity in terms of organisational resources and actions and we follow this lead. We use an intellectual capital (IC) perspective to identify knowledge resources (Kang and Snell, 2009). This literature provides a well-researched and clear framework within which we explored how human, social and organisational capital supports the achievement of ambidexterity at an operational level.

As we will show, our empirical data highlighted that the configurations of IC resources are more complicated than previously theorised, thereby enabling us to demonstrate a fine-grained analysis of ambidexterity.

We supplemented the findings of the initial systematic literature review, with two further targeted reviews. The first considered ambidexterity at the operational level, the second, ambidexterity and PM.

2.2 Ambidexterity at the Operational Level

Turner et al. (2013) show that ambidexterity has been studied within a range of management disciplines, but analysis of journals in which publications have occurred reveals that studying ambidexterity in detail at the operational level has not been a major field of investigation (as

supported by Kristal et al., 2010). To investigate this further and to bring the review up to date, we undertook a shorter review of the latest papers in key journals. This again used the search term 'ambidex*' in five major journals using EBSCO Business Source Complete. The results are shown in Table 1.

***** Insert Table 1 about here *****

These papers were reviewed with the purpose of identifying appropriate concepts and mechanisms. Adler et al. (2009) discuss the 'productivity dilemma' whereby mature processes provide few opportunities for learning and, therefore, improved performance. We argue that this is often not the case in projects, where performance across a range of industries remains poor (e.g. Standish Group, 2009) despite the growth of internal and external standards. Adler et al. (2009) suggest that bureaucracy can be compatible with the necessary knowledge generation so long as it takes an "enabling" form (p.109). In terms of organisational design alternatives, they discuss a model of high/low bureaucratisation versus social structure (high/low trust) depending upon the task, yet acknowledge the inadequacy of this as a response system. We drew on these ideas in our study, as we show later.

Not all of the papers in Table 1 were relevant to our investigation, but some provided insight. There was good agreement on the desirability of ambidexterity at the operational level: McDermott and Prajogo (2012) find it beneficial in service innovation; Kristal et al. (2010) highlight the benefit of an ambidextrous supply chain strategy, also taking a knowledge-based view; Riccaboni and Moliterni (2009) find from the life sciences industry that companies able to combine exploitation and exploration occupy a stable position at the core of the network structure and gain competitive advantage.

Chandrasekaran et al. (2012) identify ambidexterity as a competency rather than a performance outcome, and argue that actual performance will only occur long after the competency is developed. Ambidexterity is therefore a means, rather than an end in itself. They theorised three antecedents to ambidexterity: decision risk capability at the strategic level, contextual alignment at the meso level, and structural differentiation at the project (implementation) level. This third point is interesting as they hypothesise that structural differentiation between exploitative and exploratory projects aids ambidexterity competency, but their survey data does not support this. They recommend more granular research in projects for increased understanding, which is what we present here.

McCarthy and Gordon (2011) advocate different forms of control systems to balance different levels of exploitation and exploration in R&D organisations, and these include 'belief systems' – the set of basic values and the direction that senior management give and reinforce. These help align behaviours and attitudes. Lin and McDonough (2011) also emphasise the role of organisational culture (as promoted by senior management) in enabling ambidexterity.

2.3 Ambidexterity and PM

Using Scopus, we used the search terms 'ambidex*' (to accommodate 'ambidexterity' and 'ambidextrous') AND 'Project Management'. The search returned 26 journal articles. 9 were eliminated as ambidexterity was not a key concept in the work (e.g. 'the ambidextrous organisation' was only context). Of the remaining 17, the key themes were support for the importance of ambidexterity in projects (e.g. Eriksson, 2013; Leybourne and Sainter, 2012) and its positive impact on project performance (e.g. Liu and Leitner, 2012). The papers

distinguished between the level of consideration, from a national-level (Bhat, 2011), to an organisation-level (Napier et al., 2011), a functional (IS) competence (Tarafdar and Gordon, 2007) and others questioning whether the conceptualisation of ambidexterity as an organisational phenomenon usefully applies at the project level (Liu et al., 2012). Ahn et al. (2006), consider it at a product-level in an organisation, as well as contributing to the concept of co-existence of both exploitative and exploratory activities, a key component of our discourse. Ambidexterity is also considered to be an individual role (Pavlou and El Sawy, 2010) and a leadership competence (Aubry and Lièvre, 2010). The most relevant work to our perspective of intellectual capital was Tiwana (2008), which is considered further, below.

Overall, though, consideration of *how* ambidexterity is achieved, is called for (Eriksson, 2013; Liu et al., 2012) as there has been very limited research into the mechanisms within projects.

In sum, the literature is clear on the desirability of ambidexterity at the operational level, but has not yet answered the 'how' of ambidexterity in terms of the mechanisms underpinning its achievement. This is an important area that warrants further theoretical and empirical investigation.

2.4 Theoretical Development

We draw upon the theory of intellectual capital (IC) in our investigation of the resources and mechanisms which enable ambidexterity at the operational level (Kang and Snell, 2009; Turner et al., 2013). IC is a broadly defined term with many interpretations (Hsu and Wang, 2012; Swart, 2006) but we follow Bontis (1998:5) in understanding it as "the stock of knowledge within the firm." Kang and Snell (2009) develop an 'architectural' approach, in

which IC resources comprise *human capital* (HC, the tacit and explicit knowledge within individuals), *social capital* (SC, the knowledge embedded in personal relationships) and *organisational capital* (OC, methods, procedures and explicit knowledge). They advocate that each of these can be understood as potentially having exploitative and exploratory aspects. HC can be *specialist* (exploitative), such as extensive technical expertise or *generalist* (exploratory), such as broad experience in general management roles, yet exists in the heads of individuals (Hedberg, 1981). A *cooperative* (exploitative) approach to SC uses dense social networks, for example, established project teams with strong ties; whereas an *entrepreneurial* (exploratory) approach uses weaker ties to seek new knowledge (Burt, 1992; Granovetter, 1973; Reagans and McEvily, 2003). OC, in which organisational knowledge is preserved (Daft and Weick, 1984), can be *mechanistic* (a systematic, controlled, approach), or *organic* (more flexible and adaptive) in nature (Burns and Stalker, 1961).

Kang and Snell (2009) further propose that ambidexterity can be achieved by implementing one of two specific architectures (i.e. patterns or combinations of knowledge resources). They advocate either '*disciplined extrapolation'* (combining generalist HC, entrepreneurial SC and mechanistic OC) or '*refined interpolation'* (specialist HC, cooperative SC and organic OC). This representation fits with observed project practice, either allowing flexibility for specialist expertise, or adding a more disciplined approach to innovative teams. However, this appears limited (are there really only two possible architectures?). Furthermore, there is no empirical evidence (as yet) either that ambidexterity is supported by these architectures, or that it could not be achieved via alternative architectures. We therefore sought to build on this work to examine further the nature of IC resource configurations supporting the management of projects.

The state of ambidexterity recognises the co-existence of both exploitation and exploration, and the prevailing argument within the literature is that these modes are capable of simultaneous occurrence rather than being at opposite ends of a continuum (Cao et al., 2009; Gupta et al., 2006). However, there is sufficient argument for separation of organisational units that exploit and explore to require that we first identify whether exploration and exploitation can and do co-exist at an operational level in projects. Ambidexterity also aided our theorisation of IC resources and we proposed that the IC resources can similarly be understood in this manner. Thus both generalist and specialist HC can be expected to exist simultaneously within projects, or within a single managerial role (Hansen and von Oetinger, 2001), together with a beneficial range of diverse social contacts and relationships (SC) (Tiwana, 2008), and a balance between procedural rigour and flexible innovation (OC) (Brown and Eisenhardt, 1997; Marlow et al., 2010; Simsek, 2009). Thus the incorporation of orthogonality into the Kang and Snell (2009) model allows for a wider range of options and the accommodation of operational complexity.

We sought to identify first the existence of ambidexterity at the operational level in projects, and then mechanisms enabling this, using the IC lens. By examining the six key resources (HC, SC and OC, each in exploitative or exploratory form) individually and then in combination, we wanted to provide a clearer picture of ambidexterity. Much of the literature to date has taken a quantitative approach; here we opt for a qualitative analysis to gain a richer insight into the underlying mechanisms. Our chosen method of semi-structured interviews allowed a focused investigation of the types of IC and discussions around the nature of exploitation and exploration in the context of projects, while allowing for other issues to emerge and give further clarity to the investigation. In the following sections we present our research methods and analysis.

3. Case Context and Method

Access to a global IT-services company was obtained, whose business is to provide a wide range of application (software) development, infrastructure, business process management and other services to both the commercial and public sectors. The company is organised around the needs of its major clients and structured based on the accounts that it supports. Each large account is therefore a semi-autonomous business unit. Client work covers two major business streams: *change* and *run*. Change involves the transformation of the business processes of clients through their IT (hardware, software, location and configuration). Run involves the on-going support and maintenance of their infrastructure. Our prime area of concern was change, organised as a series of projects. Change work typically lasts from several months to many years. The context is therefore one of semi-permanence and embedding of the company's employees in its clients' businesses. We limited the consideration to the largest clients as these provided relatively stable business units and each therefore a project-based organisation (PBO) in its own right. Each PBO is a temporary organisation-within-an-organisation (Engwall, 2003; Lundin and Söderholm, 1995) offering complicated structures such that we would expect to see complex manifestations (Grabher, 2004) of ambidexterity over the lifecycle of the work. Individual projects utilise elements of standardised technology solutions together with well-defined operational processes and structures, emphasising exploitation. However, since each customer requirement offers its own unique set of challenges, this must be supported by exploratory activities (Geraldi et al., 2011b). This project-based context is therefore one that provides an ideal environment to examine the mechanisms by which ambidexterity is achieved at an operational level. The level of analysis was the project, and the unit of analysis was the manager (consistent with

Mom et al., 2007). Practical limitations prevented us performing longitudinal case studies, but an IT-services organisation is, as indicated earlier, is highly suitable as a context in which to study ambidexterity (Junni et al. 2013; O'Reilly and Tushman, 2013).

An initial interview protocol was developed based on the intellectual capital model of Kang and Snell (2009), supported by a review of ambidexterity questionnaire protocols extracted from published articles, and other associated literature. The interview protocol addressed each individual's role and experience in project-based operations, then their HC in terms of specialism / generalism and how this could be interpreted in their current and previous projects (Kang and Snell, 2009; Ketkar and Sett, 2009). Aspects of SC investigated were the importance of social relationships, communication, trust, and knowledge access and sharing (Jansen et al., 2006; Tiwana, 2008). The OC component investigated the use of rigour and control versus flexibility (Im and Rai, 2008; Ketkar and Sett, 2009), and details of implementation. Questions on exploitation and exploration activities looked at how the managers viewed the ideas of knowledge refinement and knowledge generation, and how they understood this in terms of their activities (Jansen et al., 2006; Kale, 2010; Li et al., 2008; Lubatkin et al., 2006; Morgan and Berthon, 2008). Finally, they were asked to reflect on what they had discussed and assess their project execution.

A pilot investigation was undertaken involving interviews with 7 practitioners from different business units (covering defence, automotive and banking) in order to refine the protocol. All interviews were recorded and fully transcribed for analysis. Following this, minor amends were made to the protocol. The same protocol was used and followed for the main interviews and a database of results kept, to increase reliability (Yin, 2009:41).

Sixteen managers were subsequently interviewed - practicing managers with *experience of managing projects* rather than purely *project managers*. Managers were selected on the basis of having at least five years' experience (to have encountered typical issues within a number of project lifecycles), and therefore likely to be able to give rich, descriptive answers as part of the interview process. Respondents were providing services to organisations involved in multi-client commercial (2), public sector administration (2), banking (4), defence communications infrastructure (4), and defence product development (4). A wide range of contexts was chosen to avoid over-emphasising unique characteristics of individual industries, and 14 different projects were covered. Note that due to the long-term nature of the IT-services contracts the case organisation engaged in, staff could be engaged with key clients for many years, and so, for example, managers in the banking sector would express little knowledge of the work of their colleagues in the defence sector, and vice versa. For this reason the interviews represented more closely a set of multi-industry cases with limited commonality, rather than characterising a single case organisation. This improves the validity of the study (Yin, 2009:43), although only a single firm was used.

Participants included project managers (10), programme managers (responsible for multiple projects – 2 managers interviewed) and project management office (PMO) managers (responsible for overseeing the implementation of project management systems – 4 managers interviewed) from the various business units.

Data collected in the semi-structured interviews focused on their role and experience of projects in general rather than exclusively on their immediate tasks or project(s). This gave a broad picture of the actions undertaken by managers rather than in just one situation.

Interviews typically lasted one hour, all but one were performed face-to-face, and all were recorded and fully transcribed.

4. Analysis and Findings: A Complex Picture

Analysis of the interview transcripts was performed in NVivo 8 using an initial *a priori* coding template based on

1. the incidence of ambidexterity (i.e. exploitation and exploration) in the actions described by managers
2. the IC *resources* (HC, SC and OC) in those actions
3. whether each activity involved exploitation and exploration of that IC resource.

4.1 Initial Findings

Despite the complicated nature of the concepts being explored in this paper, respondents were readily able to give examples of both exploitative and exploratory HC, SC and OC. More difficult were specific instances of exploitation and exploration and, although the principles could be explained to the interviewee, attempting to 'bind' these concepts with 'pure' examples and practices was challenging. However, it was evident from every interviewee that both exploitative and exploratory activities were being undertaken at the project level, satisfying our initial question of whether ambidexterity could in fact be identified. After 10 interviews, theoretical saturation was detected (Eisenhardt, 1989). Subsequent interviews added examples from different industrial areas. As will be demonstrated, saturation was 'only' detected in terms of the data that was being sought, that of examples of IC, together with exploitation and exploration. Later interviews offered little new insight using the

primary coding scheme, but did provide valuable additional material for a subsequent parallel-coding phase, discussed below.

Firstly, ambidexterity was readily identified in every interview as a natural part of the role of a project manager. This supported our initial justification of this context as a suitable one in which to investigate ambidexterity. However, this was not the result of a deliberate strategy on the part of the managers interviewed or their organisations. None of the respondents appeared to recognise the tasks of exploitation and exploration in such clear-cut terms, although the requirements to operate in such modes were inherently incorporated into their delivery objectives and day-to-day actions. Within the data we had nearly twice as many coding instances of exploitation as of exploration, thereby satisfying our first question of identifying ambidexterity in this context, although indicating a predominance of the exploitative approach.

IC resources could indeed also be understood as orthogonal in nature and co-existing, as theorised. We now discuss each of the resources in turn.

4.2 Human Capital

Kang and Snell (2009) argue that HC contains either specialist or generalist aspects and analysis of the responses indicated that managing projects required both facets. In this data, specialist knowledge includes project management knowledge (skills, training, qualifications, knowledge of relevant tools, procedures and techniques), technical domain knowledge (of the IT solution being applied) and/or client knowledge. Generalist knowledge can be understood

as previous experience, and an understanding of the project within the wider context of business strategy and operations, both within the company and the client.

> "I'm not as familiar with the processes as maybe I should be and I think it's because I've got a delivery deadline that's looming and I feel I don't have the time to perhaps understand and follow the process so I kind of do what instinctively feels right to get the job done."

> "I think you do a lot of things because you've had things go wrong before. You remember to check things or not to take certain things people say at face value or to follow through on particular things because you know it is something that might come back and bite you later on in the project. And if it was your first project, it would be a lot harder, definitely. As you go through your projects, you become battle-scarred and it does help in the next project. Not that you don't make mistakes on the next project, but hopefully you avoid some and make different ones."

The data showed that project managers use both specialist and generalist HC to enable ambidexterity. Although some respondents appeared to favour one mode over another, upon further discussion they identified that the other was also present in their work.

4.3 Social Capital

The role of SC was identified as being highly significant for the effectiveness of the manager and generated the most coding elements. The responses of the interviewees showed that it was, in their opinions, highly important. Strong relationships were highlighted as crucial in enabling smooth project functioning, for instance:

> "We work well with the customer, which is very important, and the technical infrastructure guys. Because you know them you can just walk up and chat with them and if you have an issue you can discuss it with them straight away. So I think the social element is really important to getting a good start and keeping it going."

While clearly important, managers regarded it as difficult to assess:

> "Yes we don't have the people side of it - the things that are easy to measure, [we] measure ourselves on those because they are easy to measure, we don't tend to look at the people aspects, the emotional aspects, the social aspects."

Numerous facets of SC emerged from the data, and these can be analysed in terms of the *structural*, *cognitive* and *relational/affective* dimensions of social capital (Kang et al., 2007; Nahapiet and Ghoshal, 1998). The structural network can be understood in terms of strong ties (i.e. the project team, with frequent communication) and weak ties (a wide range of occasional contacts) respectively. There was evidence that the managers used both, and that cultivating the wider network was advantageous, although these mechanisms were serendipitous rather than formal. The project manager network corresponds well to the ideas of Tiwana (2008) that strong ties should complement 'bridging' ties.

In terms of the cognitive aspects, the role of the manager is that of an integrator, often bringing together different knowledge domains while keeping an overview of the project. The project manager needs to ensure that relevant information on issues reaches him/her, but knowing all the details is not always necessary. Consistent with this being a social act, the

role of communication was highlighted as being fundamental to effectiveness, and required a balance of the informal and formal, with a tendency towards the informal. Co-location was emphasised as beneficial, but not always possible. As one manager noted:

> "A good PM is probably what I'd call a 'wide boy', somebody that can wheel and deal and yes, duck and dive, work in different environments, can talk at the highest levels on that, as it were, or get down and dirty and talk about the football and have a beer, because you can transcend all the levels."

In the affective dimension, trust emerged as a critical factor in enabling the relationships of the project manager. In the words of one manager, "It's essential". This is not just at the interpersonal level, but also at the inter-organisational level. A strong client relationship aids progress through clarifying requirements and solving problems. This can be particularly difficult in consortium arrangements where (otherwise competing) organisations are trying to work together in a temporary organisation to deliver a common project; a lack of relationships with other consortium members seriously hampers progress. In summary, the social capital that acted as the 'glue' that held these projects together came through clearly from all the interviewees, and drawing on both exploitative and exploratory SC was demonstrated as important in performing as an effective manager.

4.4 Organisational Capital

There was a widespread view from the respondents that effective project working required both an exploitative framework of organisational project processes and structures (mechanistic OC), together with a flexible (organic) approach to accommodate emergent

issues or uncertainty. Instances of technical difficulties, revisions to requirements, organisational upheavals and contractual challenges were prevalent and would preclude a purely exploitative approach. However, such flexibility was not seen to be exclusively exploratory, for instance where it involved moving between pre-programmed options. This co-existence of mechanistic and organic OC demonstrates ambidexterity *within* working practices, as the balance between the operational framework and day-to-day flexibility. As one interviewee commented:

> "You need to follow some processes on one scale, and on another, you need to be very focused on what you are delivering to the customer. So I think they fall to some sort of terminology, healthy cynicism or something like that… so the Company may be saying, 'You should be doing it this way', but you should be challenging it all the time."

The existence of mechanistic exploitation was evident in reporting and documentation requirements, e.g., lessons learnt from other projects and trying new ideas based on other projects' experience. The methods in place and the learning activities were not always hailed as successful, but provided an operating framework for projects and on-going improvements.

> "Officially? Officially, one follows a process and works to this big document… Once you've done those documents, you go, 'Right, there you go, that's the audit sorted, now let's get on with the project!'"

The organic (exploratory) aspects of OC also came through clearly, although this was difficult to identify as a stand-alone element as it was linked to mechanistic OC and the

exploitation/exploration process activities. Interviewees varied in their preference over which type of resource to use and indicated that the role of the PM was to manage the OC appropriately.

> "You kick your plan off, and then you're running with it, and this black hole might not even be visible at the beginning of it, it might come half way along, there's a block and you think 'I don't know how to do that!'".

To summarise, the analysis shows that all of the IC resources were used, in both exploratory and exploitative modes. Ambidexterity was therefore present at this level too. Again, there was no evidence of deliberate organisational or individual strategies for managing knowledge assets, and while much activity on the part of the firm focuses on OC, PMs talked more about the importance of SC. The nature of IC in this context is summarised in Table 2 (based on Kang and Snell, 2009).

***** Insert Table 2 about here *****

However, while the above is both interesting and a step forward in our theoretical understanding, the analysis still did not do justice to the data. It was evident that managers had a much richer and more integrative approach to managing knowledge resources. They frequently used combinations of knowledge resources, evidenced by the simultaneous occurrence of IC codes in the data analysis. For instance, technical prototyping was being used to explore the most appropriate way forward under conditions of uncertainty, and this could be augmented with group problem-solving:

> "We had people from the operation, technical people, we had business people from programme level and from project level and we all sat round the table and what could we do to get around this? And at the end of the day, we've come up with a different approach."

Such activities do not fall neatly into a single coding category, multiple forms of IC are necessary for their enactment. This provided the insight that led to the next stage of analysis.

4.5 Identifying Ambidexterity Mechanisms

The first stage of this analysis identified the existence of ambidexterity. The second stage analysed the knowledge resources used by managers, the nature of this resource usage, and to determine that ambidexterity existed at this level too. This last stage returned to the data to draw out the mechanisms underpinning the attainment of ambidexterity. This was achieved via 'parallel-coding' the interview data (King, 2004). It was evident that there were multiple combinations of resources used, and to conceive of them as independent elements was inadequate. We parallel-coded the data in terms in terms of HC, SC and OC. Each section of transcript could be analysed to show *combinations* of codes, from which to gain greater insight.

There were parallel-coded instances within the data, representing all seven possible individual and combinative uses of knowledge resources. This was from a total of 876 coded elements. This analysis showed that there are interrelationships between the IC elements. It illuminates our understanding given that the literature to date has conceptualised ambidexterity primarily at the group- or firm-level where the HC, SC and OC can be understood as separate, although co-existing (Kang and Snell, 2009; Subramaniam and

Youndt, 2005; Youndt et al., 2004). Indeed, Kang and Snell (2009) suggest that the forms of capital are conceptually distinct, yet may be related in practice. The existence of these elements in combination supports and amplifies the findings of Reed et al. (2006).

We thematically grouped the parallel-codes and identified seven major mechanisms, as shown in Figure 1, and these will now be discussed. No hierarchy or relative importance is intended.

***** Insert Figure 1 about here *****

The individual use of knowledge assets has been discussed in the previous section. In this section we identify the use of the remaining four combination possibilities – SC + OC, OC + HC, SC + HC and all three together – HC + SC + OC. This is highly significant, and adds to our understanding, as it indicates clearly that some mechanisms are dependent upon combinations of capital that together add value.

4.6 'Socialised Control': SC + OC

These codes accounted for 43 coding instances. The prevalence of SC highlights the importance of the social and relational aspects of project working and the significance this plays in enabling the operationalisation of formal organisational systems. For example:

> "I would be working with a team that were not all based on the same site… so I guess a mixture of the structure of a weekly meeting and then obviously a lot of emails and phone calls and ad hoc meetings for specific issues or to get specific interested individuals in to discuss a particular problem."

Manifestations can be complicated to understand fully, though, with few 'simple' solutions:

> "We had one project, a fraud project I worked on, the teams just integrated seamlessly. We would go out for drinks together, things like that, and I remember one of the programme people in the bank asking us, 'Why did the project work so well?' Because other ones weren't. And the easy answer was, well, because we just worked together. And it was give and take. 'I know we said *that* in the scope, but actually, we want to do *this'* 'Fine, OK, I can accommodate that', 'I've got nothing in my budget, but what about that?' 'Well actually, that is a complete change', and they would say, 'OK we'll raise a change request then'. And it just worked superbly and it was delivered."

Although SC and OC were individually identified as effective form of capital earlier, this shows that the combination of the two is valuable in a subtly different way. Processes and actions can be communicated, shared, negotiated, and issues resolved using both SC and OC. In discussing this with managers afterwards, they readily accepted that this is a significant part of how they work, but previous theorisations had not captured this explicitly.

4.7 'Process Customisation': OC + HC

The combination of HC and OC accounted for 33 instances. Most prevalent within this was the coding of exploitative HC with exploitative PC (14 occurrences), which showed that the utilisation of project processes by the manager is not simply the adoption of standard procedures as defined by the Company, but that practical choice is also determined by the manager's experience of their utilisation. The HC and PC are therefore combined to create a

unique set of conditions (another manager may approach the problem from a different perspective and history), and parallel-coding highlights this. This may aid in the understanding of the management of ambidexterity as the creation of, and response to, a variety of strategic conditions that evolve over time and demand complex interaction.

> "I think the approach I like is to have the detailed process, but it's like a library, just go in and say, yes, I want this, this and this, I'm not going to take every book off the shelf, I just know for these circumstances I need X, Y, Z and that's the approach I prefer…. but you've got to have the required knowledge, experience, to know that you just want this, this and this. You can't just walk in off the street and say I'll have A, B and C, when you actually want X, Y and Z."

Another manager commented:

> "You need to have done your apprenticeship effectively to know how to do it properly… I struggle with people that have done project management for a year, two years, call themselves a project manager and go off contracting, earn lots of money. I've interviewed a few, 'I'm the best thing since sliced bread' - no - or 'I've done a certification, I'm now a project manager' - no you're not. I'll take someone who's got the experience over someone that's got the certification every time."

This experience and flexibility helps drive the project activity and can resolve any lack of initial clarity. Again, this made sense to managers with whom we discussed these findings. Personal experience from previous projects is valuable in knowing how to use processes

effectively in a particular situation, and none expected that an 'unthinking' approach to following project procedures would lead to the successful outcome they desired.

4.8 'Personal Network Utilisation': HC + SC

The combination of the HC and SC codes was identified in 16 instances. It is a key aspect of the managerial role, indicating the interwoven nature of personal experience and the network in which the individual operates.

> "There is no way I could deliver this project by myself. I'm technically not that competent but also there is too much work to do. And so, my role as a project manager is to draw on the skills of different people and that's where I think that experience helps."

> "A project manager is almost like a facilitator and an integrator as well, and you may not know but you have to bring the right people in together to have the brainstorming session to understand how you might solve the problem and it might not be people on your project. And there's a network of project managers effectively under the programme manager and to be honest between us we would borrow each other's people and so on. I guess as you work on an account you get to know the different skill sets of the developers and the different people as well. which is helpful."

4.9 'Resource Integration': HC + SC + OC

The last combination involved all three of the IC elements. These accounted for 20 instances, and highlight the highly complex interactions between the resources that cannot be distilled to an attribution to a single element. This fine-grained analysis indicates that in some actions,

the resources are intertwined with one another in the process of enabling ambidexterity. For example:

> "I think education is important in terms of the end users of the processes and tools you are putting in place, getting them involved in the development and the ideas phase, so that they embrace it from the beginning, they are part of it, it's not being done to them, it's being done with them."

Another explained:

> "I get lots of phone calls and emails because people tend to know that I'm quite interested in methodologies and process, so I get questions from people I don't know… For example someone came to me for [project] 'health checks', it's only because I quite enjoy doing them and that sense of achievement helping people develop and grow but then by association you come as the expert on doing those… people know that if they come to me I should be able to help you out, but there's nothing written down anyway to say that it's me."

4.10 'Resource Scarcity'

The findings indicate that we must consider not just the existence and contribution of each IC element, but also its integration with other resources. While not the focus of this work, there was a strong indication that the lack of an IC resource was significant for the work of the operation. As one manager who had a poorly-performing project and was working as part of a consortium of companies stated:

> "One thing I've noticed is that there's a sense of 'I can disappear back to my home organisation and you can never find me', so it's very difficult to build a normal relationship with somebody, right, with everybody fighting from a different corner… The relationships are gone, are burnt, and the people are tired, so what's happening is that the process is driving things."

Procedural reliance was not perceived as being effective, yet any deviation from agreed procedure could result in the re-ignition of conflict. Exploitation (in terms of process-following) was occurring with minimal problem-solving or exploration. Poor relationships meant that neither the team HC nor the OC were being utilised effectively, which was associated with poor project performance (delays, costs, low customer satisfaction). This one instance from the data shows that the absence of a key resource (SC) may have profoundly negative effects, i.e. a deficiency in one element may hinder the effective utilisation of another, and that while combinations can be viewed as mechanisms of ambidexterity, some scarcities can be thought of 'anti-mechanisms'.

5. Conclusions and Implications

The wider literature is vocal about the merits of ambidexterity, but largely silent on how it is achieved in practice, i.e. the operational mechanisms. We have examined a number of IT-service projects, to see if and how this ambidexterity is achieved in practice.

We found that ambidexterity – the simultaneous exploitation and exploration of knowledge - was prevalent in the management of projects but, in our data, was not the result of any deliberate strategy. Given the claimed benefits of achieving ambidexterity, it would appear

beneficial to explore this further in future. In addition, although the conceptions of exploitation and exploration may be understood in terms of March (1991) and have been used in many survey instruments, our qualitative analysis indicates that these terms were not sufficient to code many of the activities described by the respondents. Such a qualitative analysis shows the inherent 'messiness' of managerial reality (e.g. Bennis and O'Toole, 2005) and is both a challenge and an opportunity to understand ambidexterity better.

Next, using an intellectual capital perspective, we were able to investigate which resources enable operational-level ambidexterity and found that intricate combinations of human, social and organisational capital were present in the projects. This provides a fine-grained understanding of how these resources are used in combination and therefore advances the literature on the complexity of managerial mechanism at the level of the project. Specifically, whilst firms often promote OC in the form of process, managers also emphasised the vital role of SC in their work. This supports the ideas of Adler et al. (2009), Lin and McDonough (2011) and McCarthy and Gordon (2011) described earlier.

It was also clear that considering each of the IC resources alone was insufficient in explaining the mechanisms by which ambidexterity was being achieved. We found that the elements are used independently, but also in every possible combination. We showed this in Figure 1 and demonstrated the relationships between the elements of intellectual capital and the combination mechanisms we identified in the study ('socialised control', 'process customisation', 'personal network utilisation', and 'resource integration'). In addition, there was an indication that a lack of a particular element (our example showed a lack of SC), had a particularly negative effect on the ability of the operation to function effectively. This 'resource scarcity' appears to be worth exploring further.

We have tested these findings with both project managers and Masters-level students of project management and it has shown its value in two ways. First, participants find it beneficial and insightful to be able to recognise their work using the framework of Table 2. This can highlight ways of working that perhaps were being under-exploited, indicating areas that could be developed or focused upon to improve their project performance. Second, the work, and the discussions that it generates, can be used to 'legitimise' important aspects of project work. Specifically, the ideas of flexibility and innovation, and especially the important nature of social capital, are often implicitly understood by practicing managers, yet they are often reluctant to advocate these within their organisations as the processes and procedures they work within can constrain such discussions. Students have thanked us for giving them a rationale for going back into the organisations with this more complex, nuanced, view, in order to justify new ways of working. Consequently, such a re-conceptualisation of PM using the language of ambidexterity and intellectual capital can enable promotion and dissemination of these ideas when back in the role.

6. Areas for further research

Our analysis shows that exploration and exploitation in projects co-exist, and also now how they coexist. Our interest going forward is to develop the underlying theoretical basis for this. Farjoun (2010) contends that stability and change should not be considered as a *dualism* where one precludes the other, but as a *duality*, whereby stability may enable change, and change may enable stability. The acceptance of the duality model for exploration and exploitation may necessitate the recognition of the interwoven nature of the constructs, such that "the duality view casts doubts on organizations' ability to separate elements of stability

and change so neatly. Individuals engaged in routine tasks exercise some degree of experimentation, and those engaged in creative tasks use routines to some degree." (ibid, 2010:218). This view is in line with the findings from these interviews. The duality concept sheds light on our understanding of ambidexterity and provides a rationale as to why disentangling the concepts is challenging.

A limitation of the work is that it is based on a relatively small number of interviews within multiple business units from a single case organisation, and greater generalisability would be achieved through a wider-scale study. The method described here can be replicated in further settings to investigate the stability of the mechanisms identified. In addition, the identification of the mechanisms allows a much more broadly-based quantitative analysis of their prevalence across a range of sectors, and their effect on organisational project performance. This appears to be a fruitful next stage in the research.

Our findings indicate that if one or more IC elements are missing, operational performance may actually be weaker. This is in contrast to the suggestions of Kang and Snell (2009) who offer two alternative 'architectural' options based on a subset of potential IC resources. This link between architecture and performance appears also to be a valuable area in which to continue researching. While this study was not specifically intended to address project performance or outcomes, this was a finding we thought valuable and worth considering further in a subsequent investigation.

Lastly, contextual ambidexterity is understood at the organisational level (Gibson and Birkinshaw, 2004). Through this work we have developed a means to understand this at the operational level. Further work can refine this by empirically investigating the utilisation of

the mechanisms by multiple organisational participants (for example, a management team) such that ambidexterity is achieved. Subsequent research might also examine organisations longitudinally, thereby showing a clearer picture of their evolution. It may also be worthwhile to explore the specific managerial actions that sustain the mechanisms. This research demonstrates the value for both researchers and practitioners of conceptualising ambidexterity at the operational level.

In summary, the main contributions of the paper are (i) the identification of the knowledge resources which enable ambidexterity, and (ii) the mechanisms which are adopted at an operational level, in this case, in projects. An additional methodological contribution of the paper is the illustration of how parallel-coding and can be used to analyse rich data collected at an operational level. Finally, our findings demonstrate how managers combine knowledge resources, i.e. how they achieve ambidexterity in projects.

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Figure 1: Mechanisms which Enable Ambidexterity

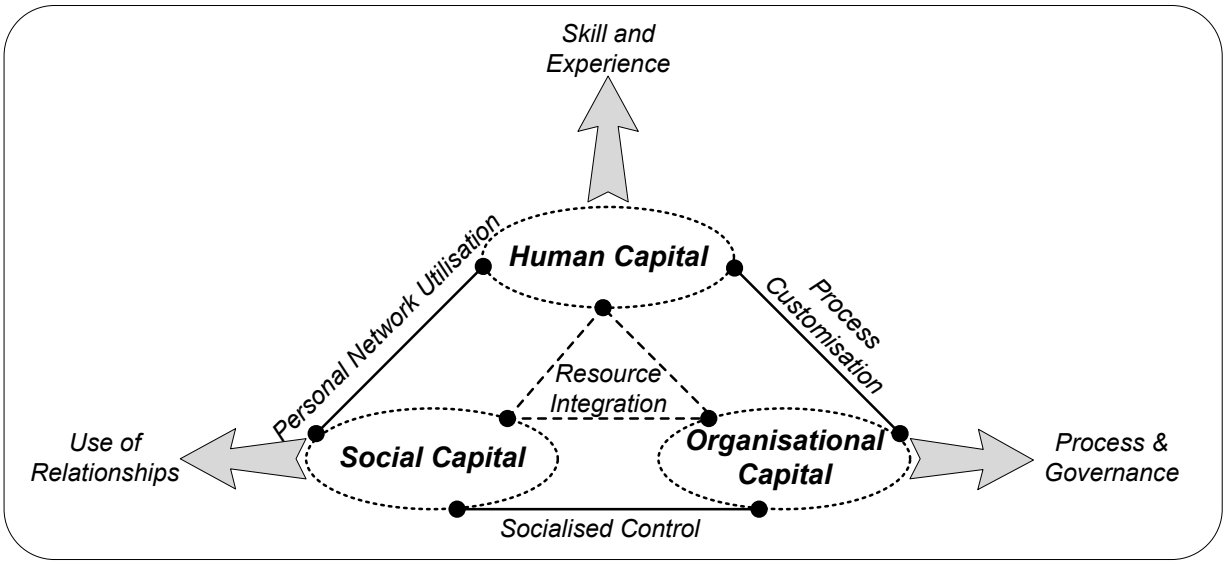

Table 1: OM Journal 'Ambidexterity' papers.

Journal	Papers Found
IEEE Transactions on Engineering Management	Du et al., 2013 Grover et al., 2007 Lin and McDonough, 2011
International Journal of Operations and Production Management	McDermott and Prajogo, 2012
Journal of Operations Management	Adler et al., 2009 Chandrasekaran et al., 2012 Kristal et al., 2010 Patel et al., 2012
Production and Operations Management	0
R&D Management	McCarthy and Gordon, 2011 Riccaboni and Moliterni, 2009

Table 2: Summary of IC in Exploitative and Exploratory Forms.

	Exploitative	***Exploratory***
Human Capital	Specialist: domain expertise (e.g. technical and/or project management).	Generalist: wide range of experiences and skills to draw upon in any given situation.
Social Capital	Cooperative: strong ties with colleagues to share complex information efficiently.	Entrepreneurial: access to a wide range of contacts whose knowledge and skills can be accessed when required.
Organisational Capital	Mechanistic: structures and processes in place to coordinate and control the project operational activities.	Organic: ability to accommodate unexpected events through flexibility and allow innovation and problem-solving as part of the work.